

CP29958③

## (12) UK Patent Application (19) GB (11) 2 373 506 (13) A

(43) Date of A Publication 25.09.2002

(21) Application No 0107417.8

(22) Date of Filing 24.03.2001

(71) Applicant(s)

Kuo-Hsiang Chang  
No 10-5 Mintsu Rs, Shen-Kang Hsiang,  
Taichung Hsien, TaiwanYu-Chou Lin  
No 5 Alley 4 Lane145, Tateh N Rd, Tan-Tzu Hsiang,  
Taichung Hsien, Taiwan

(72) Inventor(s)

Kuo-Hsiang Chang  
Yu-Chou Lin

(74) Agent and/or Address for Service

Wilson Gunn M'Caw  
41-51 Royal Exchange, Cross Street, MANCHESTER,  
M2 7BD, United Kingdom(51) INT CL<sup>7</sup>

C08L 31/04 // ( C08L 31/04 23:16 33:20 )

(52) UK CL (Edition T )

C3M MXC MX1H M142 M144 M154

(56) Documents Cited

GB 2270696 A  
WPI Abstract Accesion No 1981-28166D &  
JP560020042A  
PAJ Abstract for JP100265618A

(58) Field of Search

UK CL (Edition S ) C3M  
INT CL<sup>7</sup> C08L  
ONLINE: WPI, JAPIO, EPODOC

(54) Abstract Title

**Static-free synthetic rubber**

(57) A process for producing static-free synthetic rubber includes mixing ethylene vinyl acetate, acrylonitrile-butadiene, Anti-static agent, Activated zinc oxide, Zinc stearate, HI-sil (RTM), EPDM, Plasticizer, and Stearic Acid prior to a kneading process at 140 degrees Celsius for 8 to 12 minutes. (DCP) Peroxides and Blowing agents are added to the kneading mixture two minutes before the end of the kneading process. After the kneading process, the resultant mixture is fed through rollers (10, Fig 2) to form a sheet (20B, Fig 2) of the synthetic rubber. The sheet (20B) is then cut into appropriately-sized pieces and put into a mold (30, Fig 3), where the pieces are subjected to high pressure and a temperature of 160 degrees Celsius. The pieces are then left to cool, and then be used for articles such as static-free footwear.

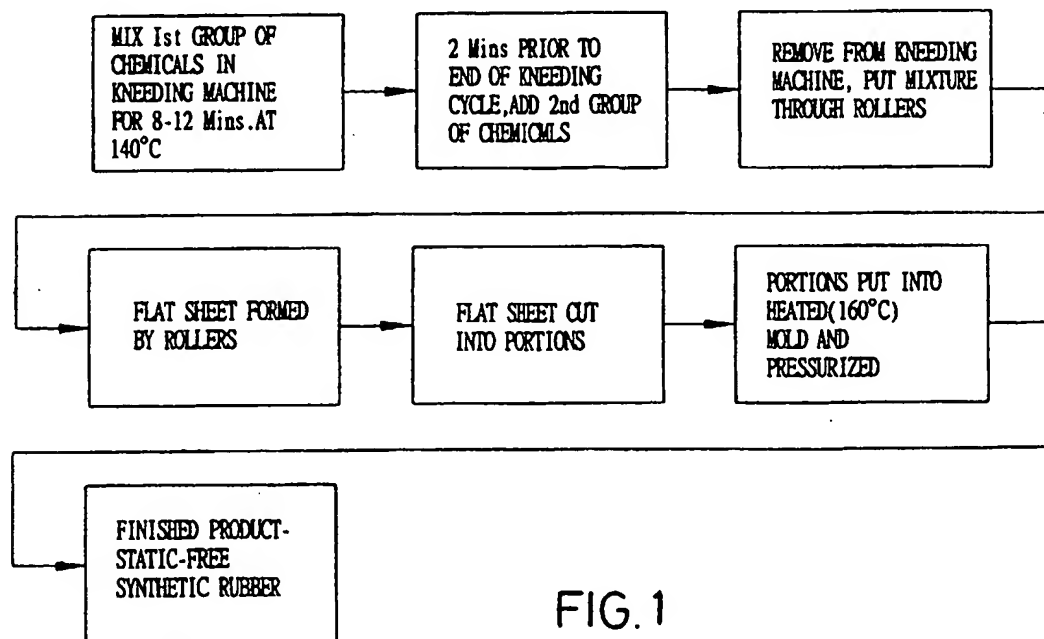


FIG. 1

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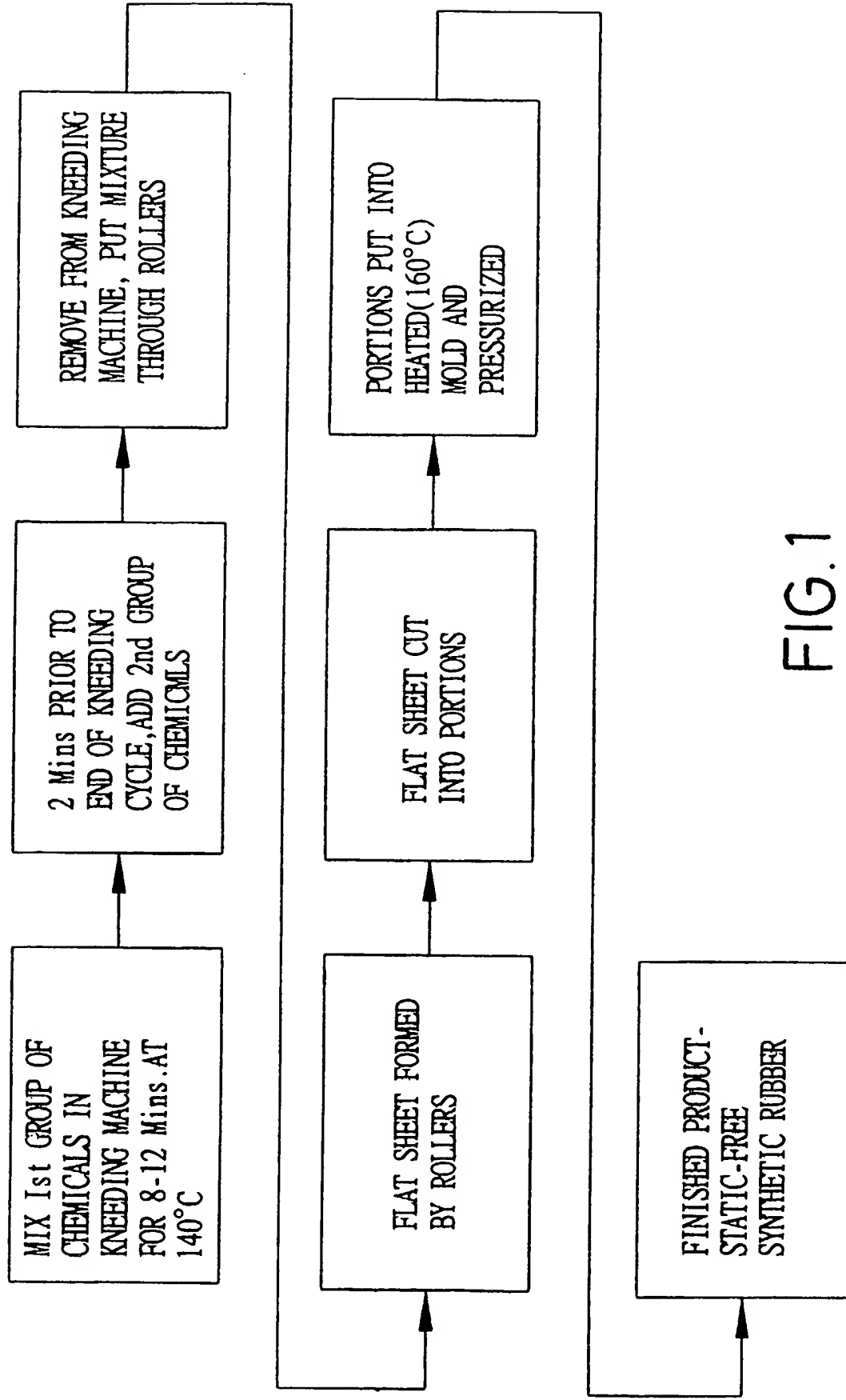
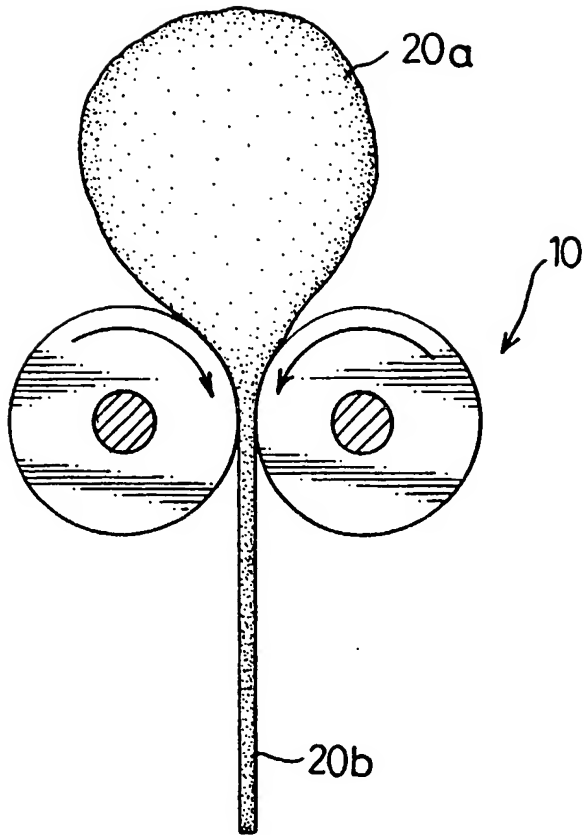


FIG.1



F I G . 2

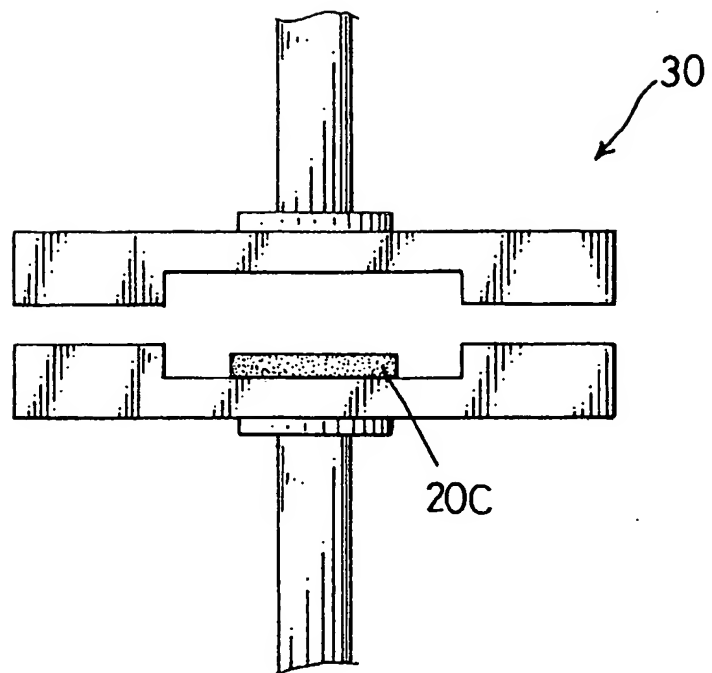


FIG. 3

## STATIC-FREE SYNTHETIC RUBBER

### 1. Field of the Invention

The present invention relates to a synthetic rubber, especially a synthetic rubber which remains free of static electricity while being used.

Synthetic rubbers have many applications and are now particularly important in the Information Technology industry, where electronic devices such as semi-conductors etc, can be seriously damaged by static electricity during their manufacture. The static electricity is often caused by shoes of workers, and then it travels through the atmosphere to the components being produced. Although so-called "static-free" rooms are devised to try to eliminate the occurrence of static, it is found that static still occurs, again often from the footwear of the workers as they move around. Thus, there is a long and unfulfilled need for a synthetic rubber which is completely static free when in use, especially static-free synthetic rubber for use on floors and footwear in the production of electrical components.

The main objective of the invention is to provide a synthetic rubber which is completely free from the production of static electricity.

A further objective of the invention is to produce a static-free synthetic rubber for use in preparing foot wear and floor coverings.

Other objects, advantages and novel features of the invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

In the drawings:

Fig. 1 is a flow chart of the production of static-free synthetic rubber in

accordance with the present invention;

Fig. 2 is a schematic view of the synthetic rubber of the present invention being passed through a pair of rollers; and

Fig. 3 is a schematic view of a portion of the synthetic rubber of the present invention prior to be further processed in a mold.

The present invention relates to a static-free synthetic rubber, and involves the process as shown in Fig.1.

The following ingredients are mixed together in ratios of weight as indicated in the parentheses:

Ethylene Vinyl Acetate (38.14%)

Acrylonitrile-butadiene (7.63%)

Anti-static agent (9.77%)

Activated Zinc Oxide (3.81%)

Zinc Stearate (1.07%)

HI-Sil (24.41%)

EPDM (7.63%)

Plasticizer (3.36%)

Stearic Acid (1.07%)

A resulting mixture (20) is put in a kneading machine, and kneaded for 8 to 12 minutes at 140 degrees Celsius. Two minutes before the projected end of the kneading cycle, (DCP) Peroxides (0.98%) and (AC) Blowing agents (2.14%) are added to produce a mixture (20A). After completion of the kneading cycle, the mixture (20A) is removed and then fed through rollers (10) as shown in Fig. 2, to

produce a sheet (20B) of the synthetic rubber in accordance with the present invention. Referring to Fig. 3, the sheet (20B) is cut into portions (20C), each of which is put into a mold (30) comprising two halves. The mold (30) is preheated to 160 degrees Celsius and the two halves are brought together, whereafter the portion (20C) is subjected to high pressure for 10 minutes, and then cooled.

The portions (20C) can be formed into shoe soles, floor mats, cushions for seating, all of which are static-free and so can be used in environments requiring which are demanded to be static-free, such as in the production of components for the Information Technology industry.

It is to be understood, however, that even though numerous characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the disclosure is illustrative only, and changes may be made in detail, especially in matters of shape, size, and arrangement of parts within the principles of the invention to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.

**CLAIMS:**

1. A static-free synthetic rubber, comprising:

Ethylene Vinyl Acetate;

Acrylonitrile-butadiene;

Anti-static agent;

Activated Zinc Oxide;

Zinc Stearate;

HI-sil;

(EPDM);

Plasticizer;

Stearic Acid;

(DCP) Peroxides; and

(AC) Blowing agents;

wherein the ingredients are in the following weight ratios:

38.14% Ethylene Vinyl Acetate;

7.63% Acrylonitrile-butadiene;

9.77% Anti-static agent;

3.81% Activated Zinc Oxide;

1.07% Zinc Stearate;

24.41% HI-sil;

7.63% (EPDM);

3.36% plasticizer; and

1.07% Stearic Acid.



2. The static-free synthetic rubber as claimed in claim 1, further including 0.98% (DCP) Peroxides and 2.14% (AC) blowing agents.

3. A process for producing a static-free synthetic rubber, including the steps:

(a) mixing the following ingredients in percentage weight ratios as shown,

38.14% Ethylene Vinyl Acetate;

7.63% Acrylonitrile-butadiene;

9.77% Anti-static agent;

3.81% Activated Zinc Oxide;

1.07% Zinc Stearate;

24.41% HI-sil;

7.63% (EPDM);

3.36% Plasticizer; and

1.07% Stearic Acid;

(b) adding the resulting mixture from step (a) for a kneading cycle in a kneading

machine for a duration of a minimum 8 minutes and a maximum of 12 minutes;

wherein a further step of adding 0.98% (DCP) Peroxides and 2.14% Blowing agents to the disclosed mixture two minutes is added before the end of the disclosed kneading cycle;

wherein the disclosed mixture in the kneading cycle is heated to 140 degrees Celsius;

wherein after the kneading cycle is finished, the mixture is fed through rollers to produce a sheet of the static-free synthetic rubber;

wherein the sheet of synthetic rubber is cut into pieces and the pieces are put into a mold to be subject to high pressure at a temperature of 160 degrees Celsius for 10 minutes.

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**Amendments to the claims have been filed as follows**

1. A static-free synthetic rubber, comprising:

Ethylene Vinyl Acetate;

Acrylonitrile-butadiene;

Anti-static agent;

Activated Zinc Oxide;

Zinc Stearate;

Hi-Sil (RTM) comprising 98% silica, 1.8% water soluble salts, and

0.05% max iron;

(EPDM)

Plasticizer;

Stearic Acid;

(DCO) Peroxides; and

(AC) Blowing agents;

wherein the ingredients are in the following weight ratios:

38.14% Ethylene Vinyl Acetate;

7.63% Acrylonitrile-butadiene;

9.77% Anti-static agent;

3.81% Activated Zinc Oxide;

1.07% Zinc Stearate;

24.41% Hi-Sil (RTM)

7.63% plasticizer;

1.07% Stearic Acid;

0.98% (DCP) Peroxides; and

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2.14% (AC) blowing agents.

2. A process for producing a static-free synthetic rubber, including the steps:

(a) mixing the following ingredients in percentage weight ratios as shown,

38.14% Ethylene Vinyl Acetate;

7.63% Acrylonitrile-butadiene;

9.77% Anti-static agent;

3.81% Activated Zinc Oxide;

1.07% Zinc Stearate;

24.41% Hi-Sil (RTM) comprising 98% silica, 1.8% water soluble

salts, and 0.05% max iron;

7.63% (EPDM);

3.36% Plasticizer; and

1.07% Stearic Acid;

(b) adding the resulting mixture from step (a) for a kneading cycle in a

kneading machine for a duration of a minimum 8 minutes and a maximum

of 12 minutes;

wherein a further step of adding 0.98% (DCP) Peroxides and 2.14% Blowing agents to the disclosed mixture two minutes is added before the end of the disclosed kneading cycle;

wherein the disclosed mixture in the kneading cycle is heated to 140 degrees Celsius;

wherein after the kneading cycle is finished, the mixture is fed through rollers to produce a sheet of the static-free synthetic rubber;



INVESTOR IN PEOPLE

Application No: GB 0107417.8  
Claims searched: 1-3

Examiner: Jason Scott  
Date of search: 6 July 2001

## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.S): C3M

Int CI (Ed.7): C08L

Other: ONLINE: WPI, JAPIO, EPODOC

### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	GB 2270696 A SHYU See whole document and in particular page 2, lines 4-15, page 3, lines 5-8 and example 1	
A	WPI Abstract Accession No 1981-28166 D & JP 56020042 A UBE (25.02.81) See abstract	
A	PAJ abstract for JP 10265618 A LONSEAL (06.10.98) See abstract	

X Document indicating lack of novelty or inventive step	A Document indicating technological background and/or state of the art
Y Document indicating lack of inventive step if combined with one or more other documents of same category.	P Document published on or after the declared priority date but before the filing date of this invention.
& Member of the same patent family	E Patent document published on or after, but with priority date earlier than, the filing date of this application.